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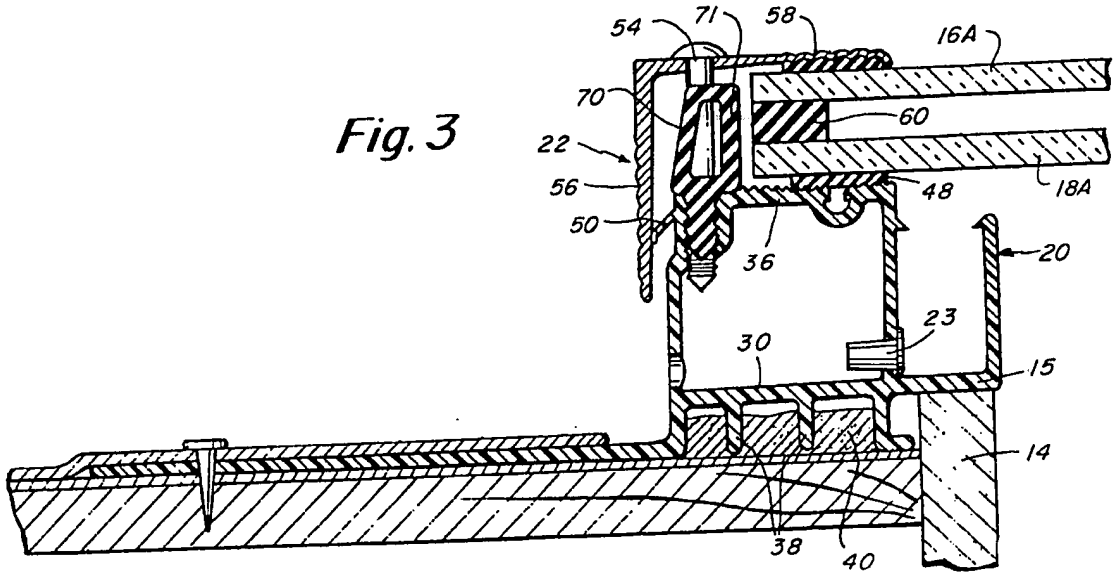
(54) **Skylight**

(57) A skylight may be domed or flat and of single or double glass (16, 18) or plastics sheet comprises a frame 20 with stops (70) extending upwardly for limiting the position of the glass etc. particularly during transportation and installation of the unit.

A second invention comprises a frame having a thermal break and a method of making such a frame.

Fig. 3



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SPECIFICATION

Skylight construction

The present invention relates to an improved skylight construction, and is concerned, more particularly, with an improved curb frame construction characterised by an improved resistance to thermal transfer of heat through the skylight.

According to one aspect of the invention, there is provided a skylight construction for an opening in a building comprising:

a curb frame extending about the opening and having means for securing the frame in fixed position about said opening,

transparent or translucent means covering the opening and extending at its edges to the curb frame,

means over the frame for retaining the covering means to the curb frame,

and stop means mounted outside but adjacent at least one edge of the covering means.

According to another aspect of the invention, there is provided a skylight construction for an opening in a building comprising:

a curb frame extending about the opening and having means for securing the frame in a fixed position about the opening,

transparent or translucent means covering the opening and extending at its edges to the curb frame,

means over the frame for retaining the covering means to the curb frame, and

said curb being of metal heat conductive material provided in inner and outer sections bridged by a low heat conductive plastic for impeding heat transfer through the curb frame.

In a preferred embodiment, the curb frame extending about the opening has means for receiving nails or the like for securing the frame in place about the opening. One, two or more transparent or translucent thermoplastic domes may be used to cover the opening and extend at the edge to the curb frame. Alternatively, the dome may be replaced by one, two or more glass panels. A retainer extends about the periphery of the skylight for holding the dome or panel on the curb frame. The curb frame may be constructed either of a rigid plastic, such as polyvinylchloride (PVC), or it may be constructed of a rigid metal such as aluminium in combination with a thermal bridge which essentially forms a thermal break in the aluminium frame extrusion. The thermal bridge may be provided by having grooves in the aluminium extrusion which are filled with a plastic which may be urethane. After the plastic hardens, the extrusion is saw cut along the bottom of the groove to interrupt the continuity of the aluminium. The plastic thus provides the structural continuity and any transfer of heat from one side of the extrusion to the other must pass through the lower heat transmitting plastic thermal bridge.

An advantage of the skylight construction of the invention is that the frame is of a construction which permits the use of a thinner upright wall and it can also accommodate a well liner beneath the extrusion thus making for a somewhat more compact construction.

In either embodiment, that is one employing a plastic curb frame or one employing a metal curb frame, there are provided preferably a series of stops associated with the frame and extending upwardly therefrom essentially placed between the frame and the retainer secured therabove. These stops are useful in the transportation of these skylights to prevent damage to the dome and are also useful in preventing damage when the skylight is to be installed on a slanted roof.

A securing screw or bolt is normally used for securing the transparent covert to the frame by means of a retainer. When the skylight is transported, especially with a flat plane construction, it may shift and engage the bolt or screw thereby cracking or damaging it. However, with one embodiment of the present invention, stop means associated with the frame are provided for limiting the position of the transparent cover relative to the frame and preventing damage to the dome or plate forming the skylight. The stop means are also useful in connection with installation of the skylight on a slanted roof.

In a preferred construction, the curb is made of a rigid material which may either be aluminium, some other metal, or a very rigid polyvinylchloride, in combination with a flexible thermoplastic material forming one or more gaskets for sealing the curbed frame to, for example, the dome or panel associated therewith.

Other features and advantages of the invention should now become apparent from the following detailed description of preferred embodiments thereof, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a cross-sectional view of a domed skylight construction through a section of the curb frame;

Figure 2 is a cross-sectional view like the one shown in Figure 1 for a different configuration frame;

Figure 3 is a cross-sectional view substantially the same as the one shown in Figure 2 and also showing the stop means of the invention;

Figure 4 is a cross-sectional view of an alternate embodiment of the invention using the thermal bridge; and

Figure 5 is an alternate cross-sectional view of the thermal bridge version of the invention.

Referring now to the drawings, the Figures 1 and 2 show a dome skylight while Figure 3 depicts a flat skylight construction.

The illustrated skylight construction spans an opening 10 which may be a square or rectangular shape and defined in part by upright walls 12. A finish material or well liner 14 is provided on the inside of the opening 10. As illustrated, the liner 14 preferably extends to a bottom wall 15 of curb frame 20.

In Figures 1 - 3, like reference characters are used to identify similar components. In Figure 1 the curb frame 20 is constructed of aluminium. In Figures 2 and 3 the curb frame is constructed of a plastic such

as PVC. In Figure 1 the skylight construction includes a pair of domes 16 and 18 which are preferably acrylic thermoplastic domes, a curb frame 20 of aluminium and a retainer 22 which may also be constructed of aluminium.

Figures 1 - 3 show a plug 23 which can be removed if condensation drainage is required. The holes are plugged with the plug 23 to prevent energy loss due to air exfiltration. In Figure 1, about the wall 12 there may be provided a flashing or roofing felt strip 24 which extends along the outer surface of the wall and about the top thereof depicted in Figure 1. The curb frame 20 may be extruded in straight sections and is secured to the top of the wall 12 over the flashing strip 24. The curb frame 20 may be secured to the wall 12 by means of a number of nails 26 which extend through the flange 28 of the curb frame 20. The curb frame also has a sealing gasket 48 received at the upper horizontal wall 36 of the curb frame. The wall 36 has an open channel for receiving a ridge 49 of the cup-shaped gasket 48. The bottom wall 30 of the frame may have nipples 38 to provide means for embedding in mastic. The mastic 40 may be laid between the flashing strip 24 and the base wall 30.

The curb frame also has an internally threaded recess which receives the bolt 54 used for securing the retainer 22 to the curb frame 20. In the embodiments of Figures 2 and 3, in which the frame is constructed in PVC, it will be seen that there is provided a further gasket 50 which may be slightly deflected to seal against the wall 56 of the retainer. The top wall 58 of the retainer presses against the edges 17 and 19 and the edge 19 rests upon the cup-shaped gasket 48 which compresses to seal against the dome. A single dome may be sufficient for certain applications and in such case the seal 60 between domes is, of course, not necessary. In the embodiment of Figure 3 wherein the dome is essentially a flat panel it is noted that these are identified by reference characters 16A and 18A to denote this difference in form of the domes. With regard to the embodiments shown in Figures 2 and 3 these are primarily adapted for use with a flat surface 62. In this connection there may be provided a layer 124 which extends over the top surface of the member 62 which may be a roof sheeting. There may be provided a number of nails such as the nail 126 shown in Figure 2. A final roofing layer 127 may also be used in association with providing a tight seal between the skylight construction and the roof to which it is affixed.

Figure 3 shows a stop 70 which may be used in place of one of the bolts 54. The stop 70 may be screwed into the accommodating recess previously meant for the bolt or it can be driven into the screw groove or hole for the bolt 54. It is preferred that the stops 70 be provided with at least two per side of the frame. In the case of transportation of the skylight prior to its being installed, these stops are helpful in preventing the panels such as domes 16 and 18 from contacting the bolts 54. It will be appreciated that the side 71 of the stop 70 extends beyond the bolt 54 so that there would be contact with the stop prior to any contact with the bolt 54. These stops are also helpful in connection with installation of the skylight on a slanted roof where the panels may be apt to slide when being installed or might tend to slide after a period over which they have been installed. The stops 70 preferably have a flat side facing the panels and are preferably constructed of a plastic such as PVC. Contact with the stops would not damage the panels in any way.

Figures 4 and 5 show two further embodiments of the present invention both employing a thermal bridge, the same reference characters being used to identify like components in Figures 1 - 3. Thus, in Figures 4 and 5 there is shown an upright wall 12, a well liner 14, a curb frame 20, and a retainer 22. As is apparent in Figures 4 and 5, the curb frames 20 are of different overall extruded configuration and also differ from the configurations shown in Figures 1 - 3. However, the curb frames are similar in that in Figures 4 and 5 they include means defining an internally threaded passage for receiving the bolts 54 which are used for securing the retainer 22 to sandwich the domes 16 and 18 between a wall of the retainer and the gasket 48 supported by a section of the curb frame. Figures 4 and 5 also show plugs 23.

Each of the frames in Figures 4 and 5 includes an inner section 20A and an outer section 20B bridged by means of the thermal bridge 21. The section 20A, is the section from which the gasket 48 is supported such as from the wall 36. Again, the gasket 48 includes a lower ridge 49 accommodated by a channel in the wall 36. The outer section 20B of the frame is for supporting the bolts 54.

The facing section of ends 20A and 20B as depicted, for example, in Figure 5 form a cavity of somewhat rectangular form. In Figures 4 and 5 the frame is shown in its final configuration. The thermal bridge 21 may be formed by first providing a groove in the aluminium extrusion such as in the wall 23. The cavity can then be filled with a plastic such as urethane. After the plastic hardens, the extrusion may then be saw cut along the bottom of the groove so as to break the continuity of the aluminium. This saw cut can be made in the wall 25 with the cuts in walls 23 and 25 defining grooves 23A and 25A as depicted clearly in Figure 5. A similar technique can also be used in connection with the fabrication of the curb frame of Figure 4. After the plastic in the cavity hardens and the lower cut is made in the aluminium extrusion there is a structural continuity but essentially a structural discontinuity as far as heat transfer is concerned as the heat must pass from one side of the extrustion to the other through the much lower heat transmitting plastic thermal barrier.

In the embodiments shown in Figures 4 and 5 which use an aluminium extrusion for the frame, there are mitre cuts at the corners thereof which are usually welded in a conventional manner. However, the plastic forming the thermal barrier cannot be welded and thus a caulking is used to complete the seal along the mitre. For one version, a narrow joint seam sealant is used while for another a "hot melt" butyl may be used to seal the exposed mitre. The "hot melt" sealant hardens almost instantly as it cools to allow handling.

Fig. 1

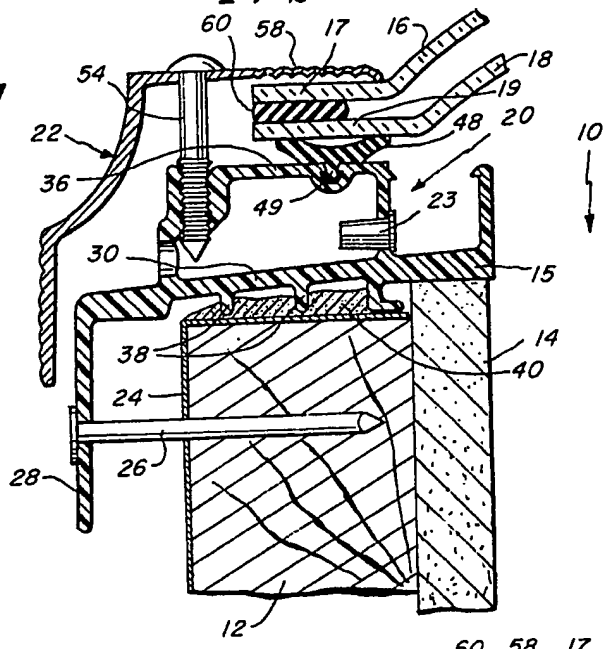


Fig. 2

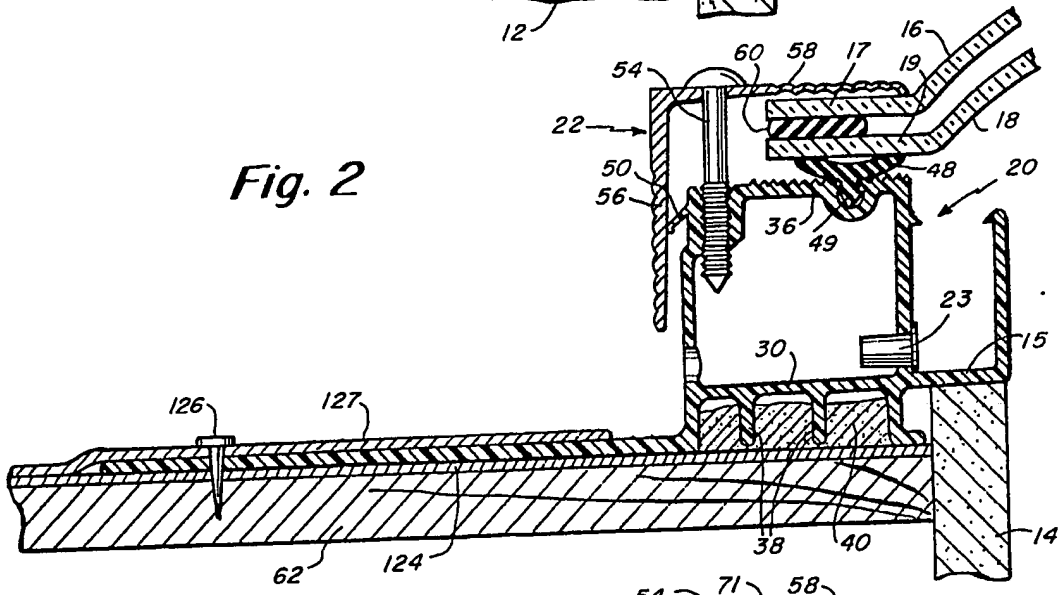


Fig. 3

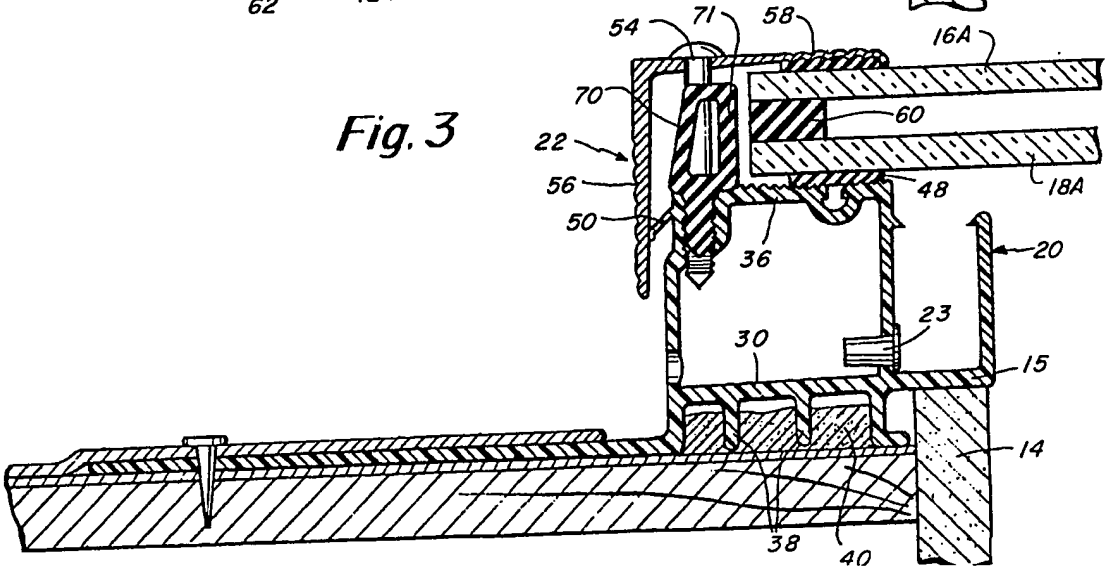


Fig. 4

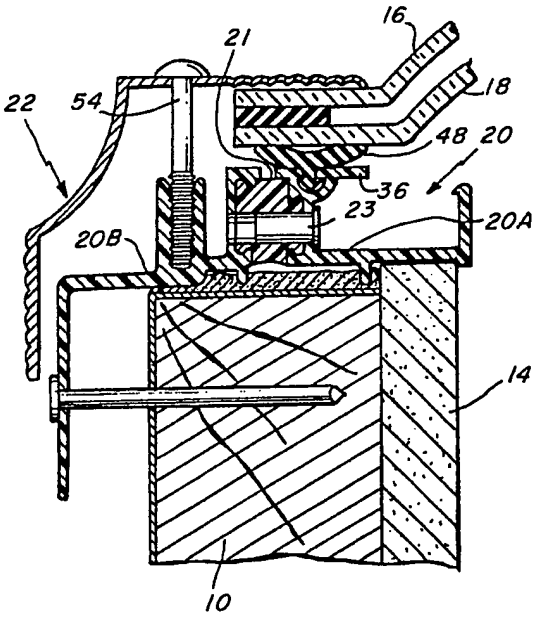
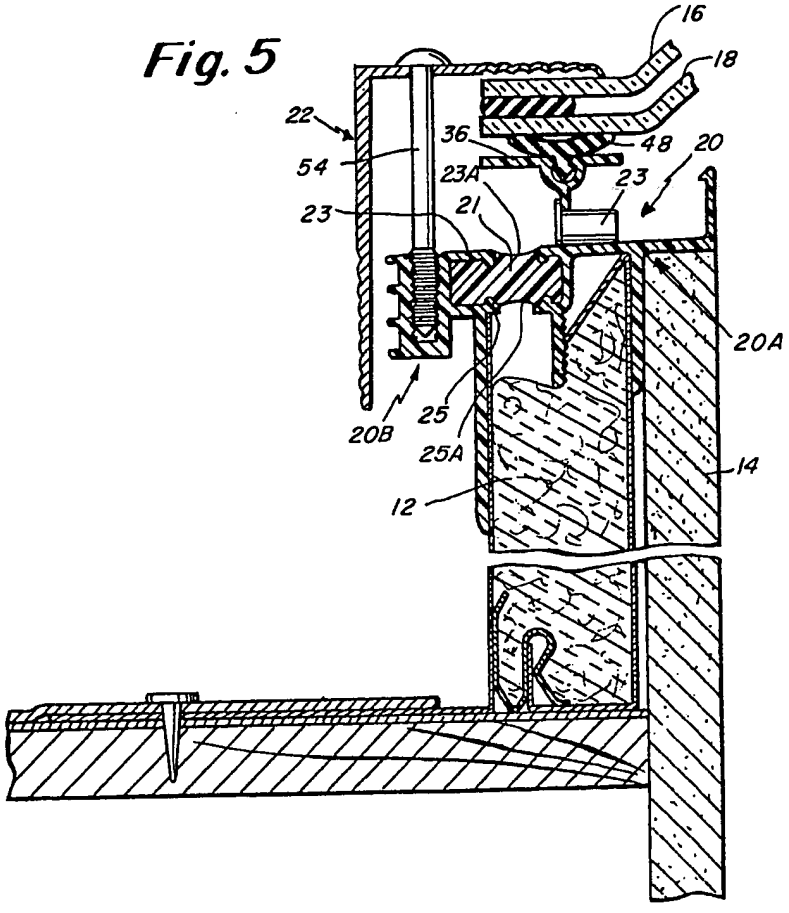

16
21
18
22
54
48
20
36
23
20A
20B
14
10

Fig. 5


16
18
22
36
48
20
54
23A
23
23
21
20A
25
20B
25A
14
12

CLAIMS

1. A skylight construction for an opening in a building comprising:
a curb frame extending about the opening and having means for securing the frame in fixed position about said opening,
transparent or translucent means covering the opening and extending at its edges to the curb frame,
means over the frame for retaining the covering means to the curb frame, and
stop means mounted outside but adjacent at least one edge of the covering means.

2. A skylight construction as claimed in claim 1, wherein said retaining means includes a retainer having one side contacting the edge of the covering means and another side extending over the curb frame.

3. A skylight construction as claimed in claim 2 including securing means for securing the retainer to the curb frame sandwiching the edge of the covering means between the curb frame and the one side of the retainer.

4. A skylight construction as claimed in claim 2, wherein said curb frame has means for receiving the stop means to support the stop means extending above the curb frame.

5. A skylight construction as claimed in claim 4, including at least two stops along at least one edge of the covering means.

6. A skylight construction as claimed in claim 3, wherein the stop means are in line with the retainer securing means but extend inwardly thereof.

7. A skylight construction for an opening in a building comprising:
a curb frame extending about the opening and having means for securing the frame in a fixed position about the opening,
transparent or translucent means covering the opening and extending at its edges to the curb frame,
means over the frame for retaining the covering means to the curb frame, and
said curb frame being of metal heat conductive material provided in inner and outer sections bridged by a low heat conductive plastic for impeding heat transfer through the curb frame.

8. A skylight construction as claimed in claim 7, wherein said curb frame has a cavity defined between sections for accommodating the plastic.

9. A method of fabricating a curb frame of a skylight construction wherein the curb frame is constructed having a centre cavity, said method comprising the steps of, providing an opening through the first wall of the frame defining the cavity, injecting a low heat conductive plastic into the cavity, permitting the plastic to harden and then opening an opposite wall defining the cavity to provide an interruption in the continuity of the metal forming the curb frame.

10. A method as claimed in claim 9, wherein the walls of the frame are cut to permit injection of the plastic and to interrupt the continuity of the metal from side to side of the frame.

11. A skylight construction substantially as herein described with reference to the accompanying drawings.

12. A method of fabricating a curb frame skylight substantially as herein described with reference to the accompanying drawings.

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